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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/646,949

08/21/2003

Andreas C. Pfahnl

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48329 7590 03/21/2007  
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EXAMINER

FORD, JOHN K

ART UNIT

PAPER NUMBER

3744

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/21/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

ED

**Office Action Summary**

Application No.

10/646,949

Applicant(s)

PFAHNL ET AL.

Examiner

John K. Ford

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3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12/18/06
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

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Applicant's response received December 18, 2006 to the election requirement of November 18, 2006 is acknowledged. Applicant elected the first species of Figure 3 without traverse and has indicated that claims 5, 7 and 10 are generic to all species. Further applicant has indicated that all of the claims (1-19) read on the elected species. The election was made without traverse and is therefore made final. The examiner disagrees with applicant's listing of claims readable on the Figure 3 species (which as explained in the specification includes the circuit shown in Figure 2). Specifically claims 4, 9, and 19 all recite some parallel branch circuit that is not disclosed in the elected Figure 3 (which as explained in the specification includes the circuit shown in Figure 2). That parallel branch is only disclosed in nonelected Figures 4 and 6. Accordingly, pursuant to the authority set forth in MPEP 821, claims 4, 9 and 19 are withdrawn here. An action on the merits as to the remainder of the claims (1-3, 5-8 and 10-18) follows.

#### Claim interpretation

Consistent with MPEP 2114, incorporated here by reference, functional language in the apparatus claims in this application is not given patentable weight in so far as it attempts to limit the structure to some particular mode of operation. For example in claim 1, stating that the evaporator has a "two-phase outlet" and that the condenser has a "two-phase inlet" does not distinguish the claim from a reference that shows an evaporator with an outlet and a condenser with an inlet. In other words the

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aforementioned inlet and outlet do not undergo a metamorphosis into a new inlet and a new outlet merely by affixing the words "two-phase" to the recited structure.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-3, 7, 8, 12, 13, 15-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

All of the enumerated claims have at least one limitation reciting either "local" or "remote", sometimes occurring in combination with the recitation "disposed proximate." The examiner has construed all of these recitations to mean that these limitations are intended to limit the respective locations of the associated structure to some degree of physical proximity, either some degree of physical "closeness" in the case of the "local" recitation and some degree of "farness" in the case of the "remote" recitation. The specification provides no guidance for how to assess these degrees of localness or remoteness and hence the limitations become no more than a "rubber yardstick" by which the interested public must gauge its conduct. For the rationale underlying this rejection, see Seattle Box v. Industrial Crating, 221 USPQ 568, 573-574 (Fed. Cir. 1984). It is submitted that no amount of experimentation will render such ambiguous terms of relative proximity definite and hence they are an invitation to be arbitrary, against the rationale behind section 112, second paragraph of the statute.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bizzell et al (USP 4,470,450).

In Bizzell, the evaporator 12 has an inlet 16 and an outlet 17. As disclosed in the paragraph spanning columns 7-8 of Bizzell, which is incorporated here by reference, bypass conduit 19 could be eliminated and the two-phase coolant (i.e. droplets and vapor) emerging from the evaporator 12 could be routed through pipe 14 directly to the inlet 20 of the condenser 13. The outlet 21 of the condenser 13 is connected to the pump 11, which, in turn, pumps the liquid back to the inlet 16 of the evaporator 12. Furthermore, according to Bizzell, this modification is particularly well suited to a situation where the "length of the connecting conduit 14 is quite short" (col. 8, lines 7-12)., which appears to be exactly the situation that applicant is faced with in his own

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disclosure. Thus, it is apparent that Bizzell already taught in the prior art what applicant independently discovered later. Finally, Bizzell teaches that the evaporator and condenser can be located on a more distant portion of the same structure in column 5, lines 55-66.

Claims 1-3, 5-8, 10-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Bizzell (USP 4,470,450) and Nelson et al (USP 4,118,756).

In Bizzell, the evaporator 12 has an inlet 16 and an outlet 17. As disclosed in the paragraph spanning columns 7-8 of Bizzell, which is incorporated here by reference, bypass conduit 19 could be eliminated and the two-phase coolant (i.e. droplets and vapor) emerging from the evaporator 12 could be routed through pipe 14 directly to the inlet 20 of the condenser 13. The outlet 21 of the condenser 13 is connected to the pump 11, which, in turn, pumps the liquid back to the inlet 16 of the evaporator 12. Furthermore, according to Bizzell, this modification is particularly well suited to a situation where the "length of the connecting conduit 14 is quite short" (col. 8, lines 7-12)., which appears to be exactly the situation that applicant is faced with in his own disclosure. Thus, it is apparent that Bizzell already taught in the prior art what applicant independently discovered later. Finally, Bizzell teaches that the evaporator and condenser can be located on a more distant portion of the same structure in column 5, lines 55-66.

Nelson teaches placing the evaporator section 1 of a circuit card cooling system in close proximity to the condenser sections (2 and 2a) of a circuit card cooling system. As disclosed in the summary section of Nelson this arrangement of the condenser section and evaporator section on the circuit board advantageously results in "essentially uniform cooling" by eliminating the high thermal gradients and high component temperatures associated with solid metal heat sinks (as described in column 1, lines 15-22 of Nelson). The condenser sections (2 and 2a) are disclosed to be "connected to a heat sink or other conventional cooling means" (Nelson, column 2, lines 28-34).

To have combined the respective teachings of Bizzell and Nelson by connecting the inlet conduit to the subcooler 26, pump 11 and other associated hardware (e.g. 27, 18 and piping etc) of Bizzell to each of the plurality of the condenser section 2 and/or 2a of Nelson and the outlet conduit from the pump of Bizzell (through valve 18) to each of the plurality of evaporator sections would have been obvious to one of ordinary skill in the art to advantageously attain the "essentially uniform cooling" discussed in Nelson. As disclosed by Bizzell the pump 11 eliminates the problem of the heat pipe failing to operate properly if the capillary pumping caused by extremely long heat pipes becomes a problem (see Bizzell Abstract, penultimate sentence). It is submitted that such an advantage as taught by Bizzell would be a further reason to have made the aforementioned

combination because Nelson, which depends on the capillary pumping between the condenser and evaporator would experience capillary pumping problems at some point if its size were increased to cool a greater number of components. The system of the combined teachings of Bizzell/Nelson would not experience such problems if one of ordinary skill desired to increase its overall size to cool more components.

Claims 1-3, 5-8, 10-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Bizzell (USP 4,470,450) and Malhammar et al (USP 5,966,957).

In Bizzell, the evaporator 12 has an inlet 16 and an outlet 17. As disclosed in the paragraph spanning columns 7-8 of Bizzell, which is incorporated here by reference, bypass conduit 19 could be eliminated and the two-phase coolant (i.e. droplets and vapor) emerging from the evaporator 12 could be routed through pipe 14 directly to the inlet 20 of the condenser 13. The outlet 21 of the condenser 13 is connected to the pump 11, which, in turn, pumps the liquid back to the inlet 16 of the evaporator 12. Furthermore, according to Bizzell, this modification is particularly well suited to a situation where the "length of the connecting conduit 14 is quite short" (col. 8, lines 7-12)., which appears to be exactly the situation that applicant is faced with in his own disclosure. Thus, it is apparent that Bizzell already taught in the prior art what applicant independently discovered later. Finally, Bizzell teaches that the evaporator and



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condenser can be located on a more distant portion of the same structure in column 5, lines 55-66.

Malhammar teaches placing the evaporator section 1a-1c of a circuit card 9 cooling system in close proximity to the condenser section 2 (integrated into plate 11) of a circuit card cooling system. As disclosed in the summary section of Malhammar this arrangement of the condenser section and evaporator section on the circuit board advantageously does not require "complicated pipe lay-outs" and advantageously "greatly increases the degree of freedom in condenser placement" relative to the evaporators. The condenser section 2 is disclosed to be a fin cooler 10.

To have combined the respective teachings of Bizzell and Malhammar by connecting the inlet conduit to the subcooler 26, pump 11 and other associated hardware (e.g. 27, 18 and piping etc) of Bizzell to each of the condenser section 2 of Malhammar and the outlet conduit from the pump of Bizzell (through valve 18) to the plurality of evaporator sections 1a-1b would have been obvious to one of ordinary skill in the art to advantageously eliminate the need to blow ambient air into the electronic enclosure to cool fins 10 of Malhammar.

Claims 1-3, 5-8, 10-18 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mizuno et al (USP 5,522,452).

In Figure 7 Mizuno discloses a structure 37 that inherently performs the function of condenser 33 shown in Figures 5 and 6. It is clear that heat must be exchanged between the two-phase fluid inside of tube 37 and the single phase fluid surrounding the outside of the tube 37. A separate remote cooler is shown at 11 in Figure 7 of Mizuno.

Claims 1-3, 5-8, 10-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Mizuno et al (USP 5,522,452) and Chu et al (USP 3,586,101).

In Figure 7 Mizuno discloses a structure 37 that inherently performs the function of condenser 33 shown in Figures 5 and 6. It is clear that heat must be exchanged between the two-phase fluid inside of tube 37 and the single phase fluid surrounding the outside of the tube 37. A separate remote cooler is shown at 11 in Figure 7 of Mizuno.

Even if the tube 37 of Mizuno were not inherently a condenser, to have made it a condenser would have been obvious to one of ordinary skill in the art in view of the teaching with respect to wall 70 of Chu et al (USP 3,586,101), to improve the cooling performance of the device, by augmenting its cooling capability.

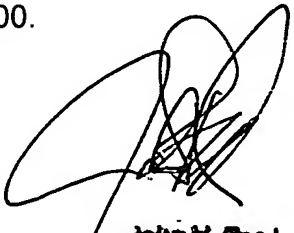
Claims 1-3, 5-8, 10-18 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chu (USP 3,586,101).

Chu discloses an evaporator 12, local condenser 70 (adjacent each of the evaporator discharge conduits 30) and a local pump 42, liquid cooler 46 (and another condenser 60 for the vapor phase). Regarding claim 5, the electronic assembly is deemed to end at the upper and lower extremes of wall 70.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John K. Ford whose telephone number is 571-272-4911. The examiner can normally be reached on Mon.-Fri. 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



**John K. Ford**  
Primary Examiner